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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/612,226
Filing Date: July 01, 2003
Appellant(s): JANKOWSKI ET AL.

Dominic M. Kotab
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 2/3/2009 appealing from the Office action mailed 8/5/2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows:

Applicant's arguments regarding the 35 USC 112, 1st rejection has been found persuasive and has been withdrawn.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 4365007	Maru	12-1982
US 5227258	Ito	7-1993
US 2004/0151955	Keskula	8-2004
US 2003/0232230	Carter	12-2003
US 2003/0044674	Mallari	3-2003
US 2003/0003332	Sederquist	1-2003
US 7077643	Holladay	7-2006
US 6777118	Shioya	8-2004
US 6454978	Thielman	9-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims Analysis

The functional recitations in claims 9, 10, and 34 have been considered but was not given patentable weight because it has been held by the courts that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (BdPatApp & Inter 1987). See MPEP 2115. It has been held by the courts that claims directed to an apparatus must be distinguished from the prior art in

terms of structure rather than function. In re Schreiber 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997). See MPEP 2115.

The limitation "for combining fuel and oxidant and generating heat" in claim 37 has been interpreted as intended use language. It has been considered, but was not given patentable weight. It has been held that if a prior art structure is capable of performing the intended use, then it meets the claim. See, e.g., In re Screiber 128, F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997). See MPEP 2111.02.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7, 9, 10, 12, 13, 28, 29, 31, 32, 34-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (US 4365007) in view of Ito (US 5227258) and Keskula (US 2004/0151955).

Maru discloses an apparatus comprising a fuel cell stack having a pair of electrodes including an anode and a cathode, and a thin film electrolyte disposed therebetween; a fuel processor 7 having a manifold positioned in fluid communication with the fuel cell stack, the manifold adapted to convey a fuel to the anode and a catalyst adapted to reform the fuel. The reform catalyst is located in the manifold and contacts the anode. See fig. 1 and 2:50-3:1-10.

Maru does not disclose the electrolyte comprising a solid oxide. However, Ito teaches of the advantages of solid oxide fuel cells (SOFCs) due to its high operating temperature, such as small polarization of expensive noble metal catalysts, high output voltage, stability and long life due to its components being solid (1:20-29). The electrolyte body can be a thin film (3:10-15). Thus, one of ordinary skill in the art at the time the invention was made using Maru's fuel cell stack would be motivated to use the fuel cell stack with solid oxide fuel cell plates for the benefit of achieving small polarization of expensive noble metal catalysts, high output voltage, stability and long life due to its components being solid, as taught by Ito.

Maru modified by Ito does not expressly disclose a manifold comprising a flow passage having at least one dimension less than 5 millimeters. However, the size of the flow passage controls the amount of reactants flowing through the fuel cell, and thus affects the amount of gas being reformed and the amount of energy generated by the fuel cell. The size of the flow passage is a result effective variable and it has been held by the courts that discovering an optimum value or workable ranges of a result-effective variable involves only routine skill in the art, and thus not novel. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See MPEP 2144.05.

Maru modified by Ito teaches a reformer, but does not teach a an electric heater positioned along a fuel path at a point upstream from the fuel cell stack for heating the fuel prior to the fuel reaching the fuel cell stack (Applicant's claim 1). Maru modified by Ito does not disclose a combustor thermally coupled to the fuel processor. Keskula teaches of an electric heating element 52 in the combustor and serves to vaporize the

liquid fuel 46 entering the combustor 34 prior to entering the fuel processor. The combustor includes a catalyst bed [0040]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add an electric heater and a combustor along the fuel passage of Maru modified by Ito for the benefit of vaporizing the fuel prior to entering the reformer.

Claims 8 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (US 4365007) in view of Ito (US 5227258) and Keskula (US 2004/0151955) as applied to claim 1 above, and further in view of Carter (US 2003/0232230).

Maru modified by Ito and Keskula teaches all the elements of claim 1. Maru modified by Ito and Keskula does not teach that the electrolyte thickness is less than 10 micrometers. However, Carter teaches that thick electrolyte layer leads to relatively high electrical resistance and electrolyte thickness is about 5-20 micrometers in prior art [0010]. Thus, it would be have been obvious to one of ordinary skill in the art at the time the invention was made to make the electrolyte thickness less than 10 micrometers for the benefit of decreasing the electrical resistance, as taught by Carter.

Maru teaches that the plate is metal (3:53).

Claim 11, 39, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (US 4365007) in view of Ito (US 5227258) and Keskula (US 2004/0151955) as applied to claim 1 above, and further in view of Mallari (US 2003/0044674).

Maru modified by Ito and Keskula teaches all the elements of claim 1. Maru modified by Ito and Keskula does not teach that the manifold includes at least one wall comprising silicon. However, Mallari teaches that some of the advantages of silicon platform provides include: (1) the ability to uniformly carry a catalyst on a surface or within a bulk fluid flow-through matrix, (2), the ability when appropriately doped, to function as a current collector for the transmission of an electrical current, and (3) the ability to be selectively sculpted, metallized and processed into complicated structures via semiconductor micro-fabrication techniques [0028]. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the manifold comprising silicon for the benefit of easy manufacturing the fuel cell apparatus on a microscale.

Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (US 4365007) in view of Ito (US 5227258) and Keskula (US 2004/0151955) as applied to claim 1 above, and further in view of Sederquist (US 2003/0003332).

Maru modified by Ito and Keskula teaches all the elements of claim 1 and are incorporated herein. Maru modified by Ito and Keskula teaches a catalyst (8 in Fig. 1 in Maru), but does not teach the catalyst as PtRu. Maru teaches a fuel reforming catalyst

as Ni, NiCr, NiCo, and Ni-Mo. Sederquist teaches a fuel processor comprising a selective oxidizer catalyst composition and noble metal reforming catalyst compositions, such as Pt/Ru as catalyst [0045]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute Maru's catalyst for Sederquist's Pt/Ru as catalyst in the fuel processor of Maru modified by Ito and Keskula because it has been held by the court that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945). Se MPEP 2144.07.

Claims 1 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holladay (US 7077643) in view of Ito (US 5227258)

Holladay discloses a microreformer 106 and a microcombustor 104 connected to a fuel cell (not shown) (10:36). The microreformer has a manifold 128. See fig. 1. The Examiner notes that a fuel cell necessarily has a pair of electrodes including an anode and a cathode, and an electrolyte disposed therebetween. The fuel processor comprises a catalyst 136. See fig. 1. The combustor is disposed on the microreformer (applicant's claim 33).

Holladay does not disclose the electrolyte comprising a solid oxide. However, Ito teaches of the advantages of solid oxide fuel cells (SOFCs) due to its high operating temperature, such as small polarization of expensive noble metal catalysts, high output voltage, stability and long life due to its components being solid (1:20-29). The electrolyte body can be a thin film (3:10-15). Thus, one of ordinary skill in the art at the

time the invention was made using Holladay's fuel cell stack would be motivated to use the fuel cell stack with solid oxide fuel cell plates for the benefit of achieving small polarization of expensive noble metal catalysts, high output voltage, stability and long life due to its components being solid, as taught by Ito.

Holladay discloses a fuel cell and a manifold with a fuel processor, but does not disclose that a manifold is disclosed on the fuel cell stack. It would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the configuration of the fuel cell system by disposing the microreformer on the fuel cell stack for the benefit of providing a compact connection between the fuel gas supply and the fuel cell.

Holladay modified by Ito teaches a fuel processor, but does not teach a an electric heater positioned along a fuel path at a point upstream from the fuel cell stack for heating the fuel prior to the fuel reaching the fuel cell stack (Applicant's claim 1). Keskula teaches of an electric heating element 52 in the combustor and serves to vaporize the liquid fuel 46 entering the combustor 34 prior to entering the fuel processor [0040]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add an electric heater and a combustor along the fuel passage of Holladay modified by Ito for the benefit of vaporizing the fuel prior to entering the fuel processor.

Claims 43 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (US 4365007) in view of Ito (US 5227258) and Keskula (US 2004/0151955) as applied to claim 1 above, and further in view of Shioya (US 6777118).

Maru modified by Ito and Keskula teaches all the elements of claim 1 and are incorporated herein. Maru modified by Ito and Keskula teaches an electric heater, but does not teach that the heater is a thin film heater. Shioya teaches of using a thin film heater 206 in a reformer to vaporize the fuel (103:1-40). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a thin film heater instead of an electric heater because it has been held by the court that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945). Se MPEP 2144.07.

(10) Response to Argument

Applicant argues that the heating element 52 is not along the fuel path and that rather, the heating element 52 is in the combustor, in which the effluent from the combustor is used to heat the heat exchanger14, and then dumped into the atmosphere. Applicant argues that the heating element 52 is out of the fuel path, the effluent of which is used to heat a heat exchanger along the fuel path.

In response, it is noted that the heater heats the combustor in which the heat is used to heat the incoming fuel, and thus is located along the fuel path upstream from

the fuel cell stack. Further, the Examiner notes that the heater 52 is part of the combustor 34, and since the combustor 34 is located upstream of the fuel path (in which the combustor effluent is used to heat the fuel processor 2), the heater is also located upstream along the fuel path. It is noted that the effect of the heater is part of the fuel path.

The Examiner notes that the claim does not require the heater to be in direct contact with the fuel itself, but only requires that the heater be along the fuel path. The Examiner notes that the effect of the heater is part of the fuel path.

*** As a side note, the Examiner refers to Applicant's fig. 10 and notes that the Applicant's fuel 206 heated by the combustor is not along the fuel path 214 upstream of the fuel cell because fuel 206 does not enter the fuel cell, but exits by 208. The fuel path 206 and 208 heated by the heater 200 is not part of the fuel path 214 that enters the fuel cell. The fuel path 206 and 208 are a separate fuel path from the fuel path 214 that enters the fuel cell. It is noted that only the effects of the fuel path 206 and 208 that enter the heater are along the fuel path 214 that enters the fuel cell.***

Applicant argues that if Maru's fuel were drawn through Keskula's combustor, the fuel would burn up into combustion byproducts that Maru's reforming catalyst 8 would probably not be able to convert (or "reform") into sufficient quantifies of hydrogen.

The Applicant is correct in that the fuel entering the electric heater 52 and the combustor 34 would burn up into Keskula's combustor. It appears that the Applicant is getting the fuel path of the fuel cell and the fuel path of the combustor mixed up. It is

noted that you would want the fuel entering the combustor 34 to burn the MeOH to provide heat to the fuel processor 2. It is the fuel entering the fuel processor 2 that converts the fuel into sufficient quantities of hydrogen to enter the fuel cell.

Applicant argues that the Examiner's Official Notice that the size of the flow passage controls the amount of gas being reformed and the amount of energy generated by the fuel cell is not supported by art of record.

In response, MPEP 2144 states that:

"To adequately traverse such a finding, an applicant must specifically point out the supposed errors in the examiner's action, which would include stating why the noticed fact is not considered to be common knowledge or well-known in the art. See 37 CFR 1.111(b). See also Chevenard, 139 F.2d at 713, 60 USPQ at 241 ("[I]n the absence of any demand by appellant for the examiner to produce authority for his statement, we will not consider this contention."). A general allegation that the claims define a patentable invention without any reference to the examiner's assertion of official notice would be inadequate. If applicant adequately traverses the examiner's assertion of official notice, the examiner must provide documentary evidence in the next Office action if the rejection is to be maintained. See 37 CFR 1.104(c)(2). See also Zurko, 258 F.3d at 1386, 59 USPQ2d at 1697 ("[T]he Board [or examiner] must point to some concrete evidence in the record in support of these findings" to satisfy the substantial evidence test). If the examiner is relying on personal knowledge to support the finding of what is known in the art, the examiner must provide an affidavit or

declaration setting forth specific factual statements and explanation to support the finding. See 37 CFR 1.104(d)(2)." (emphasis added)

The Examiner notes that the Applicant has not specifically pointed out the supposed errors in the Examiner's position on Official Notice and thus, has not properly challenged the Official Notice. In any case, Applicant is referred to Thielman (US 6454978) column 6, lines 50-53.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Cynthia Lee/

Examiner, Art Unit 1795

Conferees:

/PATRICK RYAN/

Supervisory Patent Examiner, Art Unit 1795

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Quality Assurance Specialist, TC 1700